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SUPPLEMENTARY INFORMATION

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Non-thermal X-rays from colliding wind shock acceleration in the massive binary Eta Carinae

Kenji Hamaguchi[1,2*], Michael F. Corcoran[1,3], Julian M. Pittard[4], Neetika Sharma[2], Hiromitsu Takahashi[5], Christopher M. P. Russell[6,7], Brian W. Grefenstette[8], Daniel R. Wik[9], Theodore R. Gull[6], Noel D. Richardson[10], Thomas I. Madura[11] and Anthony F. J. Moffat[12]

[1]CRESST II and X-ray Astrophysics Laboratory NASA/GSFC, Greenbelt, MD, USA. [2]Department of Physics, University of Maryland, Baltimore County, Baltimore, MD, USA. [3]The Catholic University of America, Washington, DC, USA. [4]School of Physics and Astronomy, The University of Leeds, Leeds, UK. [5]Department of Physical Science, Hiroshima University, Hiroshima, Japan. [6]Astrophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD, USA. [7]Instituto de Astrofísica, Pontificia Universidad Católica de Chile, Santiago, Chile. [8]Space Radiation Lab, California Institute of Technology, Pasadena, CA, USA. [9]Department of Physics and Astronomy, University of Utah, Salt Lake City, UT, USA. [10]Ritter Observatory, Department of Physics and Astronomy, The University of Toledo, Toledo, OH, USA. [11]Department of Physics and Astronomy, San Jose State University, One Washington Square, San Jose, CA, USA. [12]Département de physique and Centre de Recherche en Astrophysique du Québec (CRAQ), Université de Montréal, C.P., Montreal, Canada. *e-mail: Kenji.Hamaguchi@nasa.gov

Supplementary Table 1: Logs of the *NuSTAR* Observations

Abbreviation	Observation ID	Observation Start	$\phi_{\rm X}$	Exposure (ksec)	Duration (ksec)
$\rm NUS_{140331a}$	30002010002	2014 March 31 06:56	2.9389	28.8	50.1
$\rm NUS_{140331b}$	30002010003	2014 March 31 21:26	2.9393	49.7	90.6
$\rm NUS_{140526}$	30002010005	2014 May 26 11:21	2.9669	79.4	131.8
$\rm NUS_{140606}$	30002040002	2014 June 06 10:31	2.9721	32.9	50.6
$\rm NUS_{140728}$	30002040004	2014 July 28 10:31	2.9979	61.3	102.1
$\rm NUS_{140811a}$	30002010007	2014 August 11 05:36	3.0046	31.0	61.7
$\rm NUS_{140811b}$	30002010008	2014 August 11 23:01	3.0051	56.9	111.3
$\rm NUS_{140819}$	30002010010	2014 August 19 16:41	3.0089	54.5	97.1
$\rm NUS_{140926}$	30002010012	2014 September 26 00:41	3.0275	81.2	143.2
$\rm NUS_{150716}$	30101005002	2015 July 16 01:31	3.1719	23.6	38.7
$\rm NUS_{160615}$	30201030002	2016 June 15 02:36	3.3377	69.3	120.0

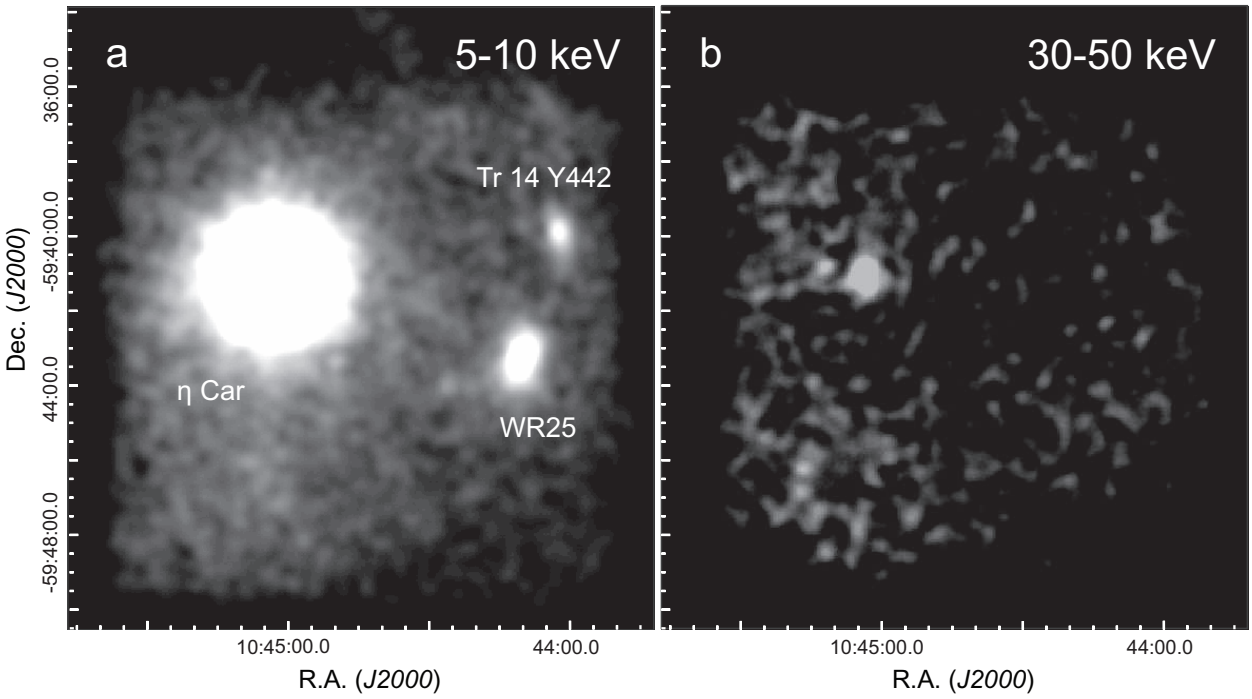
Abbreviation: Abbreviation adopted for each observation. Observation ID: Observation identification number of each observation. Observation Start: Time of the observation start. $\phi_{\rm X}$: Phase at the center of the observation in the X-ray ephemeris in (5), $\phi_{\rm X}$ = (JD[observation start] − 2450799.792)/2024. Exposure: Exposure time excluding the detector deadtime. Duration: Duration of the Observation.

Supplementary Table 2: Best-fit Parameters of the Spectral Fits

Abbreviation	Absorption	Thermal Plasma (Hot Component)			Γ=1.65 Power-law
	$N_{\rm H}$	kT	Abundance	Flux[10−15 keV]	Flux[30−50 keV]
	(10^{23} cm^{-2})	(keV)	($Z_{\odot}$)	(10^{-11} ergs cm^{-2} s^{-1})	(10^{-11} ergs cm^{-2} s^{-1})
$\rm NUS_{140331a}$	1.7 (1.3−2.0)	4.2 (4.1−4.4)	0.50 (0.47−0.53)	1.6	0.13 (0.10−0.17)
$\rm NUS_{140331b}$	1.4 (1.2−1.6)	4.2 (4.1−4.3)	0.58 (0.56−0.60)	1.9	0.19 (0.15−0.21)
$\rm NUS_{140526}$	1.9 (1.8−2.1)	4.2 (4.1−4.2)	0.58 (0.56−0.60)	2.8	0.20 (0.17−0.22)
$\rm NUS_{140606}$	2.4 (2.2−2.6)	4.7 (4.6−4.8)	0.55 (0.53−0.58)	3.3	0.26 (0.21−0.31)
$\rm NUS_{140728}$	4.1 (2.6−5.8)	4.4 (3.6−5.8)	0.40 (0.19−0.66)	0.034	0.045 (0.027−0.060)
$\rm NUS_{140811a}$	9.7 (9.2−55)	4.5 (fix)	0.50 (fix)	$<$0.020	0.039 (0.001−0.043)
$\rm NUS_{140811b}$	15 (13−19)	4.5 (fix)	0.50 (fix)	0.045	0.019 (0.004−0.033)
$\rm NUS_{140819}$	8.0 (7.4−9.0)	3.3 (3.0−3.5)	0.34 (0.27−0.41)	0.16	0.062 (0.046−0.079)
$\rm NUS_{140926}$	2.7 (2.5−2.9)	3.3 (3.2−3.4)	0.53 (0.50−0.56)	0.45	0.14 (0.12−0.15)
$\rm NUS_{150716}$	1.6 (1.0−2.1)	4.0 (3.8−4.2)	0.47 (0.41−0.53)	0.43	0.18 (0.14−0.21)
$\rm NUS_{160615}$	0.9 (0.5−1.3)	4.4 (4.2−4.5)	0.54 (0.50−0.57)	0.41	0.15 (0.13−0.18)

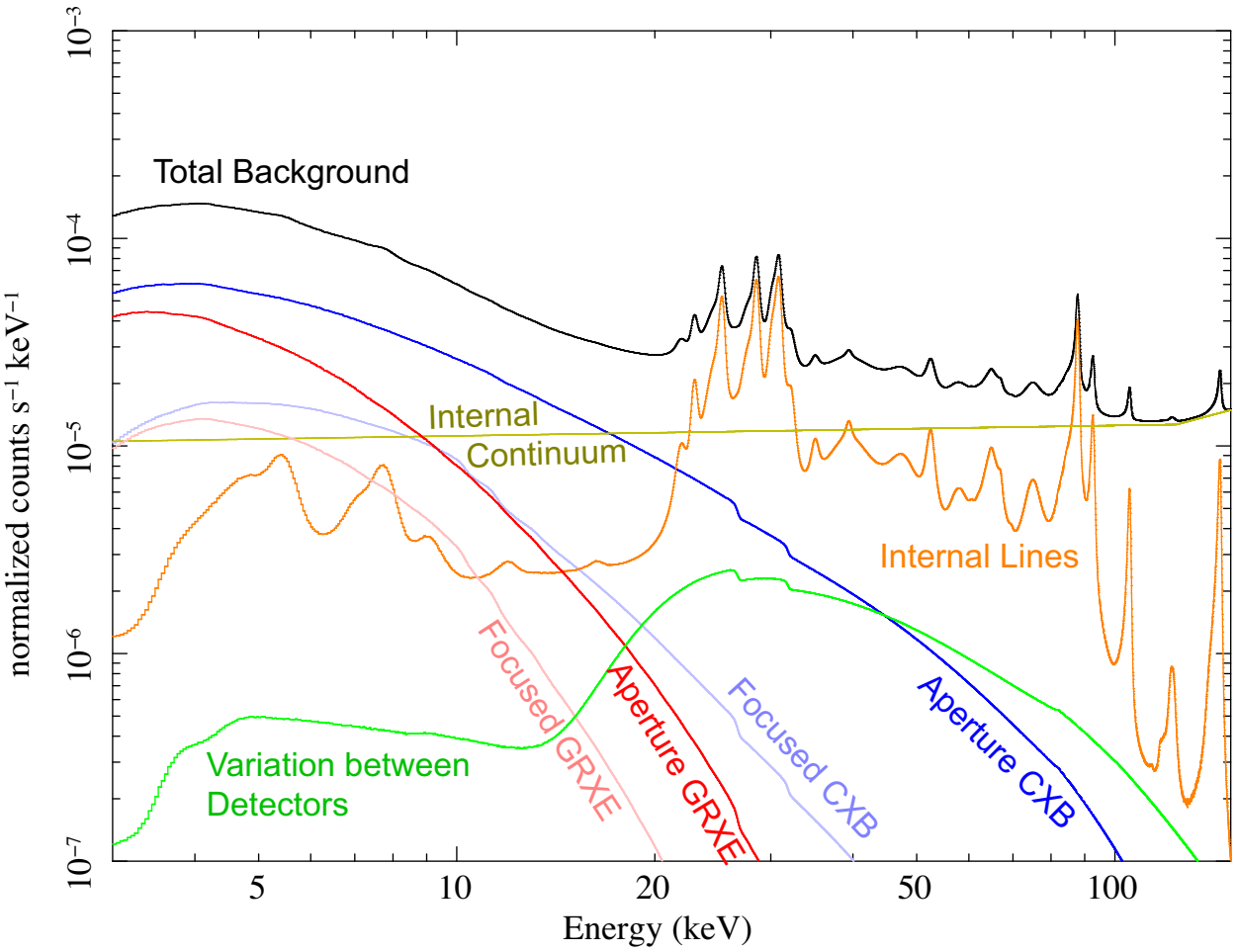
The parentheses quote 90% confidence ranges. The plasma temperatures and abundances for $\rm NUS_{140811a}$ and $\rm NUS_{140811b}$ are fixed as they are not well determined with limited photon statistics. The values in the flux columns are not corrected for absorption.

Supplementary Figure 1: Whole *NuSTAR* images of the η Car field.

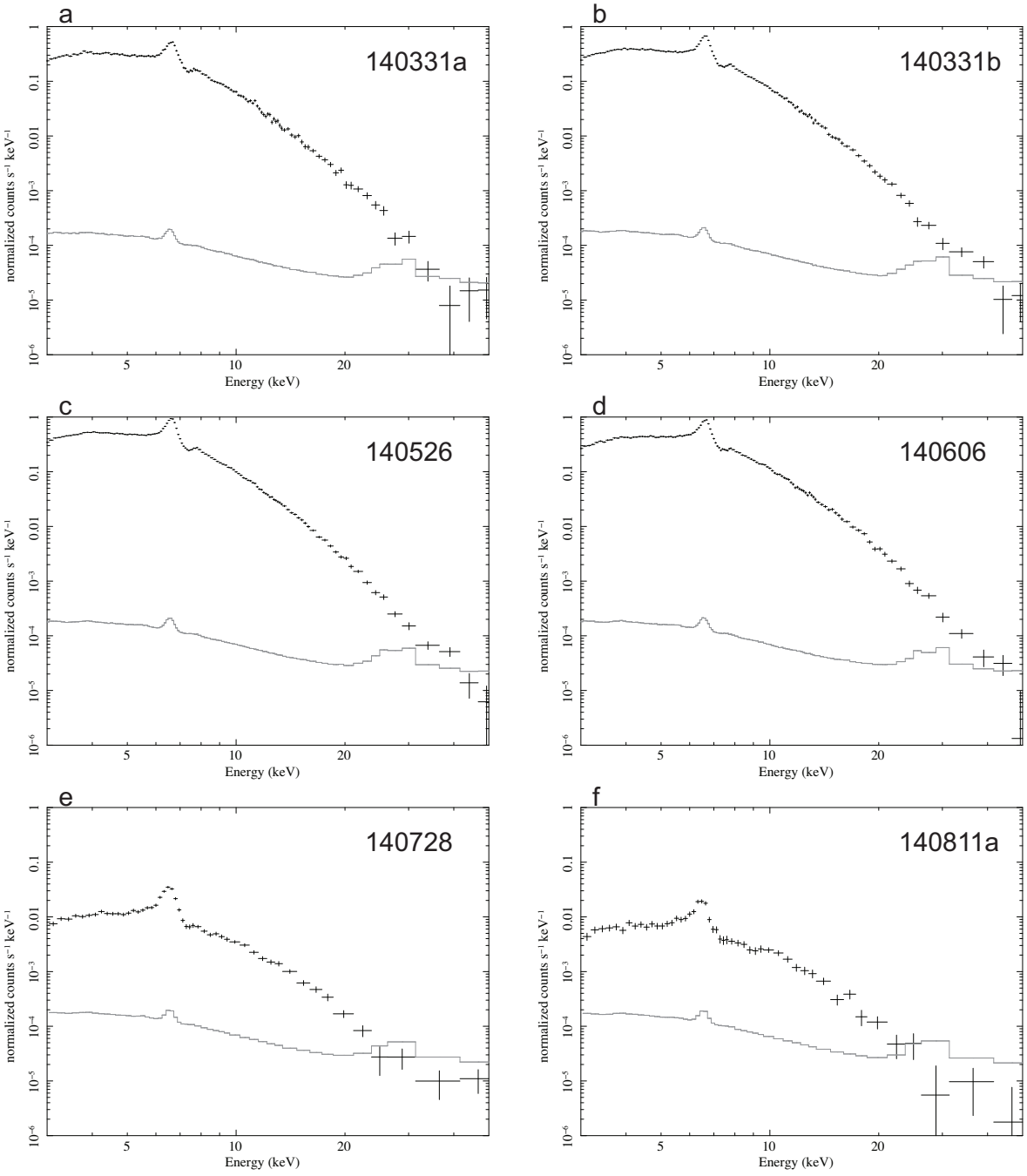


The images between 5−10 keV (**a**, log scale) and 30−50 keV (**b**, linear scale) are produced from the 2015 July 16 ($\phi_{\rm orb}$ =0.17) and 2016 June 15 ($\phi_{\rm orb}$ =0.34) observations. Each image is smoothed with a Gaussian function of σ=8 pixels. The bright X-ray source in the 5−10 keV image, Tr 14 Y442, is a young star in the Carina nebula, which had a giant flare during the 2015 observation (45).

Supplementary Figure 2: Individual background components for the FPMA η Car spectrum of the 2016 June 15 observation.



Supplementary Figure 3: Background subtracted *NuSTAR* FPMA+FPMB spectrum of each observation.



The solid grey line shows the background level.

Supplementary Figure 3: Continue.